Amendments to the Claims:

This listing will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Canceled)

2. (Previously presented) The interface in claim [[1]] 83, wherein said means for controlling activation and deactivation includes a microcontroller.

3. (Original) The interface in claim 2, wherein said microcontroller is adapted to receive control signals from an external controller.

4. (Canceled)

5. (Currently amended) The interface in claim [[1]] 83, wherein said means for controlling activation and deactivation includes a microcontroller that is adapted to receive control signals from an external controller.

6. (Currently amended) An electrical input and output (I/O) interface comprising:

a first port having ~~only~~ first and second terminals ~~for exclusively coupling~~ electrically connecting said interface to only a single first external device, wherein said interface is electrically connected to said first external device exclusively and directly via only said first and second terminals;

a second port for coupling said interface with a second device;

an operating circuit communicating with a first signal set at said first port and communicating a second signal set at said second port and performing an operation on one of said first signal set and said second signal set as an input and generating the other one of said first signal set and said second signal set as an output; and

an automatic operation selector selecting said operation performed directly by said operating circuit from among a plurality of operations internal to said interface.

7. (Original) The interface in claim 6, wherein said interface is a comprehensive universal configurable interface for interfacing a multiplicity of analog, digital, voltage, and current based signals over a multiple orders of magnitude signal range between a controller and a transducer.

8. (Canceled)

9. (Original) The interface in claim 6, wherein said first external device comprises a sensor.

10. (Original) The interface in claim 6, wherein said first external device comprises an actuator.

11. (Original) The interface in claim 6, wherein said first external device comprises either a sensor or an actuator of a machine or process.

12. (Original) The interface in claim 6, wherein said first external device comprises either a sensor or an actuator of a machine or process and said sensor or actuator are used to monitor or control said machine or process.

13. (Original) The interface in claim 6, wherein said first external device comprises a sensor or an actuator of a machine or process.

14. (Original) The interface in claim 6, wherein said first external device comprises a sensor generating a voltage signal.

15. (Original) The interface in claim 6, wherein said first external device comprises a sensor generating a current signal.

16. (Previously presented) The interface in claim 6, wherein said second device comprises an external controller.

17. (Previously presented) The interface in claim 6, wherein said second device consists of a controller and an isolation circuit interposed between said interface and an external controller.

18. (Previously presented) The interface in claim 6, wherein said second port includes a third terminal for communicating at least one of data, control or commands, and clock.

19. (Previously presented) The interface in claim 6, wherein said second port includes a third terminal for communicating data, control or commands, and clock.

20. (Previously presented) The interface in claim 6, wherein said second port includes a third terminal for communicating at least one of data, control or commands, and clock.

21. (Previously presented) The interface in claim 6, wherein said second port includes a third terminal for communicating data, a fourth terminal for communicating control or commands, and a fifth terminal for communicating clock.

22. (Previously presented) The interface in claim 6, wherein said operating circuit includes a plurality of different operating mode circuits.

23. (Previously presented) The interface in claim 6, wherein said operating circuit includes means for configuring said operating circuit to operate in a particular mode of operation.

24. (Original) The interface in claim 23, wherein said mode of operation selected from the set of operating modes consisting of a digital input signal mode, a digital output signal mode, an analog input signal mode, an analog output signal mode, and combinations thereof.

25. (Original) The interface in claim 23, wherein said mode of operation selected from the set of operating modes consisting of a Mode I operating mode, a Mode 2 operating mode, a Mode 3 operating mode, a Mode 4 operating mode, a Mode 5 operating mode, a Mode 6 operating mode, a Mode 7 operating mode, and combinations thereof.

26. (Original) The interface in claim 6, wherein said operation selector selects an operating mode from among a plurality of defined modes of operation.

27. (Previously presented) The interface in claim 6, wherein said operation selector comprises a microcontroller.

28. (Previously presented) The interface in claim 6, wherein said operation selector comprises a microcontroller coupled with at least one analog-to-digital converter for converting analog signals to digital signals for processing by said microcontroller.

29. (Previously presented) The interface in claim 27, wherein said operation selector microcontroller has a plurality of control lines for receiving input signals and a plurality of output signals to influence the operation performed by said operating circuit.

30. (Previously presented) The interface in claim 6, wherein said plurality of operations includes a digital input signal mode, a digital output signal mode, an analog input signal mode, an analog output signal mode, and combinations thereof.

31. (Previously presented) The interface in claim 6, wherein said plurality of operations includes a mode of operation selected from the set of operating modes consisting of a Mode I operating mode, a Mode 2 operating mode, a Mode 3 operating mode, a Mode 4 operating mode, a Mode 5 operating mode, a Mode 6 operating mode, a Mode 7 operating mode, and combinations thereof.

32. (Previously presented) The interface in claim 6, wherein said operation selector is operative to activate portions of said operating circuit and to deactivate other portions of said operating circuit to define an active circuit that performs a selected operation.

33. (Previously presented) The interface in claim 6, wherein said operating circuit comprises a plurality of modular circuits each for performing a predetermined signal processing function with respect to input signals and output signals, and said operation selector being operative to activate ones of said modules and to deactivate other ones of said modules to define one or more active modules that performs a selected operation.

34. (Previously presented) The interface in claim 6, wherein said operation selector is operative to activate said modules to process a signal of a particular signal type.

35. (Original) The interface in claim 34, wherein said particular signal type comprises either an input signal type or an output signal type or both.

36. (Previously presented) The interface in claim 6, wherein said interface communicates an output command to one of said first or second device commanding said external device to operate in a status corresponding to said command; and monitoring the actual operating status of said external device; said actual operating status being the same or different from the commanded status.

37. (Previously presented) The interface in claim 6, wherein said first or second device comprises an actuator.

38. (Previously presented) The interface in claim 6, wherein said first or second device comprises a sensor.

39. (Previously presented) The interface in claim 6, wherein one of said first and second device comprises an actuator and the other of said first and second device comprise a sensor.

40. (Previously presented) The interface in claim 6, wherein said interface further comprising an input current detection circuit that detects a state of a sensor current directly rather than detecting the sensor voltage to thereby reduce the effects of induced electrical noise on conductors coupling said sensor to said interface.

41. (Previously presented) The interface in claim 6, wherein said interface further comprising input current detection means for directly detecting a sensor current rather than detecting sensor voltage to determine sensor state to thereby reduce the effects of induced electrical noise appearing on sensor voltage on conductors coupling said sensor to said interface.

42. (Previously presented) The interface in claim 6, wherein:

said interface is a comprehensive universal configurable interface for interfacing a multiplicity of analog, digital, voltage, and current based signals over a multiple orders of magnitude signal range between a controller and a transducer;

said first external device comprises either a sensor or an actuator of a machine or process;

said first external device comprises a sensor generating a voltage or a current signal;

said second device comprises a controller and an isolation circuit interposed between said interface and said external controller;

said second port includes a third terminal for communicating at least one of data, control or commands, and clock;

said operating circuit includes a plurality of different operating mode circuits, and said operating circuit includes means for configuring said operating circuit to operate in a particular mode of operation;

said mode of operation comprises a digital input signal mode, a digital output signal mode, an analog input signal mode, an analog output signal mode, or combinations thereof;

said operation selector comprises a microcontroller coupled with at least one analog-to-digital converter for converting analog signals to digital signals for processing by said microcontroller;

said operation selector being operative to activate portions of said operating circuit and to deactivate other portions of said operating circuit to define an active circuit that performs a selected operation.

43. (Previously presented) The interface in claim 6, wherein:

said operating circuit comprising a plurality of modular circuits each for performing a predetermined signal processing function with respect to input signals and output signals, and said operation selector being operative to activate ones of said modules and to deactivate other ones of said modules to define one or more active modules that performs a selected operation;

said operation selector being operative to activate said modules to process a signal of a particular signal type;

said interface further comprising input current detection means for directly detecting a sensor current rather than detecting sensor voltage to determine sensor state to thereby reduce the effects of induced electrical noise appearing on sensor voltage on conductors coupling said sensor to said interface.

44. (Currently amended) An electrical input and output (I/O) interface comprising:

a first port having ~~only~~ first and second terminals ~~for exclusively coupling~~ electrically connecting said interface to only a single first external device, wherein said interface is electrically connected to said first external device exclusively and directly via only said first and second terminals;

a second port for coupling said interface with a second device; and

an operating circuit communicating with a first signal set at said first port and communicating a second signal set at said second port and performing an operation on one of said first signal set and said second signal set as an input and generating the other one of said first signal set and said second signal set as an output;

said operating circuit receiving an input from an external micro-controller directing [[a]] an operating circuit configuration ~~of~~ from operating circuit configurations internal to said operating circuit.

45. (Currently amended) A method of interfacing a process or machine controller with a sensor monitoring a condition within said process or machine or an actuator acting to modify said process or machine with a controller receiving inputs from said sensor or sending commands to said actuator; said method comprising:

~~exclusively coupling~~ electrically connecting a single ~~said~~ sensor or a single actuator, but not both simultaneously, with ~~only~~ first and second electrical terminals of an interface having a plurality of operation mode circuits ~~providing~~ that automatically sense whether said sensor or said actuator is connected to said interface and, subsequently, automatically and directly provide different signal type input and output functions including a digital input function, a digital output function, an analog input function, and an analog output function, between said interface and said sensor or said actuator, wherein said interface is electrically connected to said single sensor or said single actuator exclusively and directly via only said first and second terminals; and

controlling activation and deactivation of different ones of said operation mode circuits to provide a selected ones of said signal type input and output functions.

46. (Original) The method in claim 45, wherein said controlling activation and deactivation includes performing said activation and deactivation using a microcontroller.

47. (Original) The method in claim 46, wherein said microcontroller is adapted to receive control signals from an external controller.

48. (Previously presented) The method in claim 46, wherein said controlling activation and deactivation includes a microcontroller that is adapted to receive control signals from an external controller.

49. (Currently amended) An interface circuit comprising:

an output circuit having ~~only~~ first and second electrical terminals electrically connecting said output circuit to a single external device, the output circuit ~~that exclusively communicate~~ communicates an output command to ~~an external device coupled with said interface commanding~~ said single external device to automatically operate in a state corresponding to said command, wherein said output circuit is electrically connected to said single external device exclusively and directly via only said first and second terminals; and

a monitor circuit, internal to said interface circuit, that automatically and directly monitors the actual operating state of said single external device; said actual operating state being the same or different from the commanded state.

50. (Original) The interface circuit in claim 49, wherein said actual operating state is different from the commanded state.

51. (Previously presented) The interface in claim 49, wherein said state corresponds to a status.

52. (Currently amended) The interface in claim [[1]] 83, wherein said interface further comprises a protection circuit for reducing damage to said interface that would otherwise result in damage to said interface as a result of misconnecting or miswiring said interface to one of said ~~first or second external devices~~ sensor or said actuator.

53. (Previously presented) The interface in claim 6, wherein said interface further comprises a protection circuit for reducing damage to said interface that would otherwise result in damage to said interface as a result of misconnecting or miswiring said interface to one of said first or second external devices.

54. (Currently amended) The interface in claim [[1]] 83, wherein said interface further comprises a protection circuit for reducing damage to said first device or said second device that would otherwise result in damage to said interface as a result of misconnecting or miswiring said interface to one of said ~~first or second external devices~~ sensor or said actuator.

55. (Previously presented) The interface in claim 6, wherein said interface further comprises a protection circuit for reducing damage to said first device or said second device that would otherwise result in damage to said interface as a result of misconnecting or miswiring said interface to one of said first or second external devices.

56. (Previously presented) The interface in claim 54, wherein said interface further comprises an input current detection circuit that detects the state of a sensor current directly rather than detecting the sensor voltage to thereby reduce the effects of induced electrical noise on conductors coupling said sensor to said interface.

57. (Previously presented) The interface in claim 54, wherein said interface further comprises input current detection means for directly detecting a sensor current rather than detecting sensor voltage determine sensor state to thereby reduce the effects of induced electrical noise appearing on sensor voltage on conductors coupling said sensor to said interface.

58. (Previously presented) The interface in claim 55, wherein said interface further comprises an input current detection circuit that detects a state of a sensor current directly rather than detecting the sensor voltage to thereby reduce the effects of induced electrical noise on conductors coupling said sensor to said interface.

59. (Previously presented) The interface in claim 55, wherein said interface further comprises input current detection means for directly detecting a sensor current rather than detecting sensor voltage to

determine sensor state to thereby reduce the effects of induced electrical noise appearing on sensor voltage on conductors coupling said sensor to said interface.

60. (Previously presented) The interface in claim 6, wherein said interface further comprises means for measuring power, both real and imaginary, by dynamically switching between voltage measurements and current measurements.

61. (Previously presented) The interface in claim 6, wherein said interface further comprises: a voltage measuring circuit and a current measurement circuit each coupleable to a load, a switching circuit for dynamically switching between said voltage measurement circuit and said current measurement circuit; said combination of voltage measurements and said current measurements permitting measurement of power consumed by said load.

62. (Previously presented) The interface in claim 60, wherein said measurement of power includes measuring real and imaginary power.

63. (Canceled)

64. (Currently amended) The interface in claim [[1]] 83, further comprising means for controlling current delivered to or drawn by said ~~first external device~~ sensor or said actuator by providing a substantially constant current to said ~~first external device~~ sensor or said actuator.

65. (Currently amended) The interface in claim 64, wherein said ~~first external device~~ sensor or said actuator comprises an actuator.

66. (Previously presented) The interface in claim 6, wherein said interface further comprises a constant current control circuit for controlling a current drawn by a load device.

67. (Previously presented) The interface in claim 66, said load device includes a power level actuator in a process or machine.

68. (Previously presented) The interface in claim 66, wherein said load device includes an electromechanical solenoid actuated valve, and said constant current circuit being operative to reduce turn-on and turn-off mechanical shock to electromechanical solenoid actuated valves.

69. (Previously presented) The interface in claim 66, wherein said load device includes an inductive load component, said constant current circuit being operative to reduce electromagnetic interference (EMI) and RFI (radio frequency interference) caused by energizing or de-energizing said load device.

70. (Previously presented) The interface in claim 66, wherein said load device includes a relay device.

71. (Previously presented) The interface in claim 66, wherein said load device includes a solenoid valve device.

72. (Previously presented) The interface in claim 66, wherein said constant current circuit eliminates the need for suppression circuits to suppress turn-on and turn-off mechanical shock to electromechanical devices and inductive loads.

73. (Previously presented) The interface in claim 66, wherein said constant current circuit increases the speed of operation of inductive load devices by driving them with a substantially constant current.

74. (Original) The interface in claim 73, wherein said load device includes an incandescent lamp, and said constant current circuit preventing inherent low-resistance initial current loads of said incandescent lamps from tripping circuit breakers.

75. (Previously presented) The interface in claim 73, wherein said load device includes an incandescent lamp, and said constant current circuit substantially increases lifetime before failure of said incandescent lamps by eliminating initial thermal shock resulting from high initial turn on currents.

76. (Previously presented) The interface in claim 66, wherein said load device includes an inductive load component, and said constant current circuit reduces educing destructive effects, both human and mechanical, of inductive L(di/dt) based transients that occur when de-energizing inductive loads.

76. [second occurence] (Canceled)

77. (Previously presented) The interface in claim 82, wherein said destructive effects include destructive effects on humans in the vicinity of said inductive load containing device.

78. (Previously presented) The interface in claim 66, wherein said load device includes or couples with a triac controlled by a triac control circuit, and said constant current circuit reduces half-cycle time delay in energizing and de-energizing alternating current (ac) loads that otherwise occur with triac control circuits.

79. (Original) The interface circuit in claim 6, wherein said interface is formed as a single integrated device within a common enclosure.

80. (Original) The interface circuit in claim 6, wherein said interface is formed on a single printed circuit substrate.

81. (Previously presented) The interface in claim 6, wherein said selectable operation of said interface to inter-operate with a plurality of different sensors, actuators, and other transducers materially reduces design and engineering time associated with designing, assembling, and debugging operation of a system including said interface.

82. (Previously presented) The interface in claim 76, wherein said destructive effects include destructive mechanical effects to said inductive load containing device.

83. (New) A comprehensive input/output interface circuit for interfacing a process or machine controller with a sensor monitoring a condition within said process or machine, or an actuator acting to modify said process or machine with a controller receiving inputs from said sensor or sending commands to said actuator, comprising:

first and second electrical terminals electrically connecting a single sensor or a single actuator, but not both simultaneously, to said interface circuit, wherein said interface circuit is electrically connected to said single sensor or said single actuator exclusively and directly via only said first and second terminals;

a plurality of operation mode circuits that automatically sense whether said sensor or said actuator is connected to said interface and, subsequently, automatically and directly provide different signal type input and output functions including a digital input function, a digital output function, an analog input function, and an analog output function, between said interface circuit and said sensor or said actuator; and

means for controlling activation and deactivation of different ones of said operation mode circuits to provide selected signal type input and output functions.

84. (New) The comprehensive input/output interface circuit in claim 83, wherein operational mode input and output voltage capabilities between said interface circuit and said sensor or said actuator encompass hundreds of volts.

85. (New) The electrical input and output (I/O) interface in claim 6, wherein operating circuit input and output voltage capabilities between said interface circuit and said first external device or said second device encompass hundreds of volts.